

MONTHLY WEATHER REVIEW.

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INTRODUCTION.

The MONTHLY WEATHER REVIEW for December, 1904, is based on data from about 3300 stations, classified as follows:

Weather Bureau stations, regular, telegraph, and mail, 167; West Indian Service, cable and mail, 4; River and Flood Service, regular 43, special river and rainfall, 190, special rainfall only, 56; voluntary observers, domestic and foreign, 2565; total Weather Bureau Service, 3025; Canadian Meteorological Service, by telegraph and mail, 20, by mail only, 13; Meteorological Service of the Azores, by cable, 2; Meteorological Office, London, by cable, 8; Mexican Telegraph Company, by cable, 3; Army Post Hospital reports, 18; United States Life-Saving Service, 9; Southern Pacific Company, 96; Hawaiian Meteorological Service, 75; Jamaica Weather Service, 130; Costa Rican Meteorological Service, 25; The New Panama Canal Company, 5; Central Meteorological Observatory of Mexico, 20 station summaries, also printed daily bulletins and charts, based on simultaneous observations at about 40 stations; Mexican Federal Telegraph Service, printed daily charts, based on about 30 stations.

Special acknowledgment is made of the hearty cooperation of Prof. R. F. Stupart, Director of the Meteorological Service of the Dominion of Canada; Mr. R. C. Lydecker, Territorial Meteorologist, Honolulu, Hawaii; Señor Manuel E. Pastrana, Director of the Central Meteorological and Magnetic Observatory of Mexico; Camilo A. Gonzales, Director-General of Mexican Telegraphs; Capt. S. I. Kimball, Superintendent of the United States Life-Saving Service; Lieut. Commander H. M. Hodges, Hydrographer, United States Navy; H. Pit-

tier, Director of the Physico-Geographic Institute, San José, Costa Rica; Commandant Francisco S. Chaves, Director of the Meteorological Service of the Azores, Ponta Delgada, St. Michaels, Azores; W. N. Shaw, Esq., Secretary, Meteorological Office, London; Rev. José Algué, S. J., Director, Philippine Weather Service; and H. H. Cousins, Chemist, in charge of the Jamaica Weather Office; Señor Enrique A. Del Monte, Director of the Meteorological Service of the Republic of Cuba.

Attention is called to the fact that the clocks and self-registers at regular Weather Bureau stations are all set to seventy-fifth meridian or eastern standard time, which is exactly five hours behind Greenwich time; as far as practicable, only this standard of time is used in the text of the REVIEW, since all Weather Bureau observations are required to be taken and recorded by it. The standards used by the public in the United States and Canada and by the voluntary observers are believed to conform generally to the modern international system of standard meridians, one hour apart, beginning with Greenwich. The Hawaiian standard meridian is $157^{\circ} 30'$, or $10^{\text{h}} 30^{\text{m}}$ west of Greenwich. The Costa Rican standard meridian is that of San José, $5^{\text{h}} 36^{\text{m}}$ west of Greenwich. Records of miscellaneous phenomena that are reported occasionally in other standards of time by voluntary observers or newspaper correspondents are sometimes corrected to agree with the eastern standard; otherwise, the local standard is mentioned.

Barometric pressures, whether "station pressures" or "sea-level pressures," are now reduced to standard gravity, so that they express pressure in a standard system of absolute measures.

FORECASTS AND WARNINGS.

By Prof. E. B. GARRIOTT, in charge of Forecast Division.

During the first half of the month pressure was low over the western part of the North Atlantic, except from the 3d to the 5th, when an area of high pressure covered the eastern half of the United States and extended over Bermuda. During the latter half of the month pressure was generally high over the ocean between Bermuda and the south Atlantic coast of the United States, but low over New Foundland, Nova Scotia, and the north Atlantic coast. Over the Azores during the first half of the month the pressure was high, except from the 4th to the 8th, when an area of low pressure was apparently passing to the north of the islands. High winds were reported during this period, a velocity of 60 miles per hour from the southwest being recorded at Horta on the 6th. During the latter half of the month low pressure prevailed, the lowest barometric reading at Horta being 29.60 inches on the 28th, on which date a wind velocity of 64 miles per hour from the south was recorded. The month closed with the re-establishment of high pressure over the Azores. Over south-eastern Europe pressure was generally high, except on the 10th and from the 23d to the 26th. Over the British Isles low pressure prevailed throughout the month, except on the 18th, from the 24th to 28th, and on the 31st, when pressure was relatively high. The storm of the 12th was quite severe, and high winds and gales were reported from many coast stations. The most severe storm of the month occurred at its close. On the 29th and 30th high winds and gales did considerable damage to shipping along the coasts, and to tele-

graph lines in all parts of the United Kingdom. This storm apparently passed on over the Baltic Sea, and shipping and property in the coast towns of Germany sustained considerable loss.

The areas of low pressure that traversed the United States during the month were more numerous and took a course somewhat more southerly than usual. With a single exception these storms presented no features of particular interest. Four storms passed up the Atlantic coast during the month causing high winds and rain and snow in the coast States. A number of schooners was driven ashore, but no very great loss was sustained. On the Pacific coast the month was unusually free from storms, four only, making their appearance on the Washington and Oregon coast. The most severe of these reached the coast on the morning of the 29th and occasioned some damage to wharfs and shipping along the Washington, Oregon, and northern California coast. On the Great Lakes navigation closed December 15, and storm warnings were discontinued for the season on that date. The two storms that occurred before that time were not remarkable. During the latter half of the month, storms were more numerous, but, with one exception, did little damage. The only remarkable storm of the month traversed the country from the 24th to the 28th and reached its maximum intensity during the 27-28th, in the Lake region. Barometric readings below 29.00 inches were recorded at several Lake stations, and considerable damage was sustained from the high winds and heavy snow that

accompanied this storm. Telegraphic communication was interrupted over a large territory for twenty-four hours, and the heavy snow delayed traffic on railroads and street car lines. A more detailed account of this storm is given on another page. Storm warnings were issued in all cases well in advance of the storm and were very generally appreciated and heeded.

Temperatures were generally below the average throughout the country during the first decade of the month, except in the upper Lake region and the upper Mississippi Valley, where they were above. During the second decade they were above normal west of the Mississippi and slightly below in the east. During the third decade temperatures were quite generally below the normal in all parts of the country. The first decided cold wave of the season made its appearance in Alberta on the morning of the 22d, and by the evening of the same date had advanced over Montana. On the morning of the 23d, it covered the Dakotas, and by night had advanced southward as far as Iowa and Nebraska and eastward over Minnesota. On the morning of the 24th the cold wave had reached Kansas, and by evening had extended over the upper Mississippi and Ohio valleys and the Lake region. On the 25th the cold wave reached the New England coast, although with diminished intensity and extent. The temperatures recorded during the passage of this cold wave were not remarkably low. The most important cold wave of the month was that which followed the storm of the 24th to 28th, and is treated in connection with that storm in another place. Ample warnings were given for both of these cold waves for all localities affected, and the favorable comments of the press showed the growing appreciation of this service. The following is from the Springfield, Ill., News of December 28, 1904.

One of the worst blizzards in many years has swept this country causing distress and damage. Life and property must be sacrificed to these storm monsters that no human ingenuity can control. The best that we can do is to send warning ahead and forewarn others of their approach. This is the work the Government has undertaken in its Weather Bureau. How much life and property has been saved by the Government's system of forewarning can not be computed. There is no branch of public service that is of such immense value to the people. This is attested by the widespread credit given it and the unanimity with which shipping, mercantile, railroad, manufacturing, and farming interests watch the weather forecasts. A twenty-four hour or even twelve hour warning of the approach of such a storm as that which swept upon us yesterday is often more than ample to protect life and property that are exposed.

Heavy frost occurred in northern Florida and along the east Gulf coast on the 13th, 16th, 18th, 19th, 20th, and 21st, and killing frost on the 29th and 30th. Heavy frost occurred as far south as Tampa, Fla., on the morning of the 21st, and killing frost on the 29th. On the latter date Jacksonville reported a minimum temperature of 30°, Tampa 34°, and Jupiter 38°. These frosts were all forecast and much loss was avoided by the timely frost warnings.

The month as a whole was unusually dry throughout the country. During the first decade light rains occurred in the Southern States and on the Washington coast and light rain and snow in the Lake region. During the second decade precipitation occurred along the Atlantic and north Pacific coasts and in the Lake region. During the third decade precipitation was more general, but still deficient in amount. The prolonged drought of the Mississippi Valley and the interior of the country was broken only by the heavy rains and snows which attended the passage of the storm of the 24th to 28th.

NEW ENGLAND FORECAST DISTRICT.

The weather was abnormally and continuously cold, the monthly mean temperature for the section, 18.3°, being 9.8° below normal and without a parallel in the twenty years of records since the establishment of the New England Section of the Climate and Crop Service. Reports from numerous observers, scattered over the district, with records dating back many years, state that a new low temperature record for December was made by the month just closed. The month

was characterized by several severe storms, but those of the first part of the month were of slight importance in the northern portion of the district. Those of the latter part, however, reached all sections. Along the coast the month as a whole was considered as unusually severe and blustering, with some storms and gales of unusual force. The most conspicuous storms were those of the 18-19th and 27-28th. During the former snow fell to an unusual depth throughout Cape Cod and well into Rhode Island and eastern Connecticut. The wind prevailed with hurricane force and there was great damage to shipping and to telegraph, telephone, and trolley wires, and much delay in railroad traffic. According to the published accounts of the damage from the storm, at least fifteen schooners were torn from their anchors and driven on shore in the Vineyard Haven Harbor. So far as reported, no vessel proved a total loss and there was no loss of life. The storm of the 27-28th was severe along the coast, and in some instances resulted in dense and persistent fog. Shipping was at a standstill and in great danger. Storm warnings were issued on fourteen days of the month and doubtless resulted in the saving of many lives and of much property. No storms passed during the month without warnings.—*J. W. Smith, District Forecaster.*

WEST GULF FORECAST DISTRICT.

Warnings of frost or freezing temperature were issued on several dates for parts of the sugar region, and while on some dates the subsequent temperatures at regular Weather Bureau stations did not verify the warnings yet temperature records in the sugar region showed 8° to 14° lower, and severe freezing. The first general cold wave of the season crossed the district from the 26th to the 28th, and timely warnings were issued. Storm warnings were issued on two dates. The warnings issued for the sugar region resulted in saving much sugar cane which otherwise would have been lost. This is shown by the following press comments which also show the popular appreciation and value of the service.

The Times-Democrat (New Orleans) of December 12, 1904, in commenting editorially on the sugar crop and freezes, says:

* * * This, however, no longer causes the terror it did of old, when the freeze descended suddenly on the planters without the slightest warning, and if it came early cut down the yield of sugar 50 or even 75 per cent. The Weather Bureau now gives the planters two or three days' notice, ample time to protect themselves against any damage by a freeze.

The Picayune (New Orleans) of December 29, 1904, in speaking of the freeze of December 28, says:

While the temperature has been below freezing in the sugar and trucking region around New Orleans several times this season, the freezing mark at New Orleans was registered for the first time yesterday morning. Timely warnings were scattered broadcast by the Weather Bureau, stating that planters and the public should prepare for temperatures of 24° to 28° in the sugar region and 30° at New Orleans. The predictions were fully verified. The Weather Bureau issued warnings for every severe change in the weather, and the few failures were when certain conditions which were expected did not materialize. Farming interests consider the warnings of incalculable value, and they do not complain if a prediction sometimes falls short. One freeze without warning means the loss of many thousands of dollars, and perhaps of millions of dollars, while the expense of occasional protection when a predicted freeze does not come is a very small matter. So accurate and definite have the warnings become, that no planting interest in this State has suffered from weather conditions if the warnings are believed and action taken to prevent loss and damage.

I. M. Cline, District Forecaster.

NORTH-CENTRAL FORECAST DISTRICT.

The temperature was higher than usual throughout the district, and there were very few special features during the month. Regular navigation having closed on December 15, this date terminated the storm-warning season. No general storm warnings were issued during the first half of the month, the weather on the Lakes continuing moderate and uneventful.

The most severe storm of the month, and possibly of the